



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

SCI
1520
361

WIDENER LIBRARY



HX HERA W



Sci 1520.361

TRANSPORTATION COMMITTEE
YALE UNIVERSITY

SWINDLE

HARVARD COLLEGE



SCIENCE CENTER
LIBRARY

Sci 1520.361

TRANSPORTATION COMMITTEE
YALE UNIVERSITY

BRITISH

HARVARD COLLEGE



SCIENCE CENTER
LIBRARY

The Locomotive.

PUBLISHED BY THE



NEW SERIES.

Vol. XXIII.

HARTFORD, CONN.

1902.

HARVARD COLLEGE LIBRARY
BY EXCHANGE

1942

△
Sci 1520.361

✓

The Locomotive.

PUBLISHED BY THE HARTFORD STEAM BOILER INSPECTION AND INSURANCE COMPANY.

VOL. XXIII.

HARTFORD, CONN., JANUARY, 1902.

No. 1.

On Pipes and Pipe Threads.

Five years ago (in the issue of *THE LOCOMOTIVE* for September, 1896), we printed an illustrated article on standard sizes of wrought-iron pipe for steam, water, and gas, giving a table of the proportions that the threads on such piping should have, as well as cuts showing the length of standard thread, and the number of perfect and imperfect



FIG. 1. — FOUR-INCH, SIX-INCH, AND EIGHT-INCH PIPE, WITH STANDARD THREADS.

threads, for two-inch, three-inch, four-inch, five-inch, and six-inch pipe. The dimensions and proportions there shown, having been formally adopted, as we then explained, by the Manufacturers of Wrought Iron Pipe and Boiler Tubes, and also by the Manufacturers' Association of Brass and Iron, Steam, Gas, and Water Work, may be regarded as a national standard, and all pipe that is threaded at the mills of the manufacturers is supposed to be threaded according to this standard.



FIG. 2. — FOUR-INCH PIPE, STANDARD AT ONE END AND NOT STANDARD AT THE OTHER.



FIG. 3. — SIX-INCH PIPE ; THREAD NOT STANDARD.

But in the shops where the pipe is cut into commercial lengths, in installing new systems of piping or in repairing old ones, the standard proportions of thread are not always followed. This, in fact, is but a very mild and temperate way of stating the case; for we often find that the threads that are cut in such shops are so far from the standard of the fittings that they have to enter, that it is impossible to make a good joint in erecting the pipe; and the result is that many lines of pipe that are now running under heavy pressure are in a condition that can be fairly described as positively dangerous. The justice of this statement is abundantly proved by the failures that are constantly occurring at threaded joints; and if further evidence were required, a mere



FIG. 4. — EIGHT-INCH PIPE, WHICH COULD BE MADE UP ONLY THREE THREADS.

inspection of some of the threads that are to be found on pipes that are being made ready in these shops to go into important work, or that are taken out of such work in the course of repairs, would furnish it abundantly enough to satisfy the most incredulous.

As an example of the kind of thing that may be expected to occur, let us consider a medium size of pipe, — say a four-inch one. The standard calls for eight perfect threads, then two that are perfect at the bottom and slightly flat on the top, and then four that are imperfect on both the top and the bottom; the total length that is scored by the die on the pipe being 1.80". This is what the standard calls for, as we have said; but when we come to look at the threads that are actually turned out in the shops, we find, not uncommonly, that the total length of thread on a four-inch pipe is only 1.25", and often this is all the thread there is even on a *six-inch* pipe, where the stand-

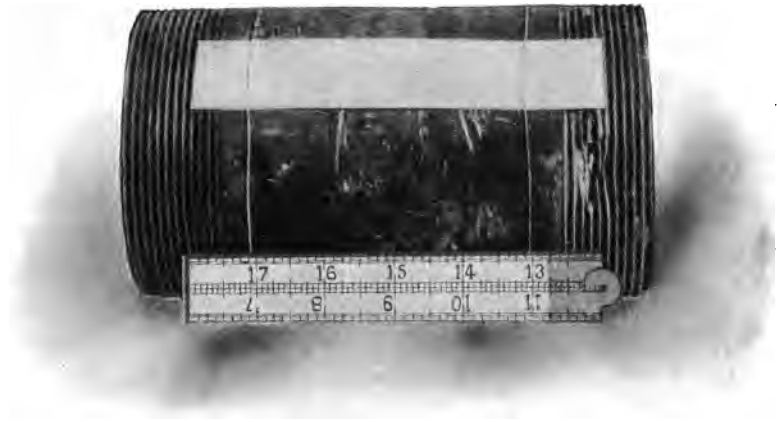


FIG. 5. — FOUR-INCH PIPE ; MADE UP ONLY FOUR THREADS AND A HALF ON ONE END.

ard calls for a total length of 2.01". Now when a pipe is threaded in such a careless manner as that, it cannot possibly be made up into a standard fitting to the full number of threads that are called for in this system, and which are essential in order to secure the requisite strength of the joint; and we regret to say that we are constantly finding pipe connections to boilers made with only two, three, or four threads properly made up. We cannot speak too strongly against such a practice, for it shows an indifference to the safety of life and the security of property that is little short of criminal. There is no excuse for it whatever, for it is easy to tell, upon looking at a pipe before the joint is made up, whether the thread upon it conforms to the standard for that size or not; and

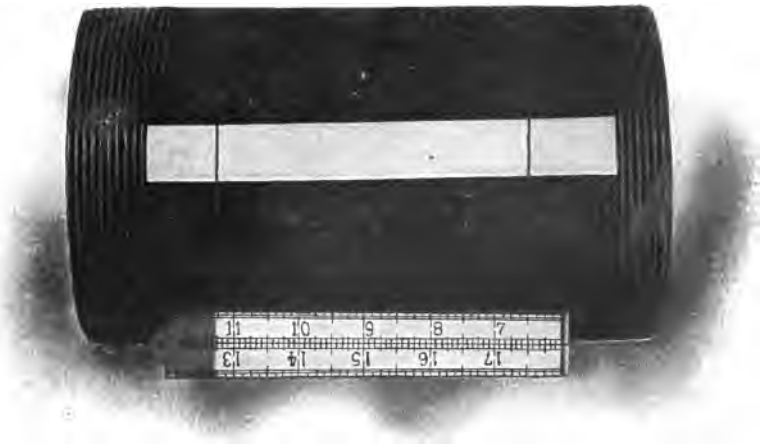


FIG. 6. — FIVE INCH PIPE ; STANDARD (OR NEARLY SO) AT ONE END. BUT NOT AT THE OTHER.

no pipe ought to be accepted that does not so conform. If a pipe has been threaded short, and then made up snug against the fitting, it is often difficult to tell, in the finished job, whether it was threaded to standard or not; but the man who puts it in has every chance to inspect it before it is made up, and there can be no excuse whatever for his passing it if it is not right.

In order to illustrate as clearly as possible the points that we are making with regard to piping, we present, herewith, a number of half-tone engravings that were made from photographs, which will show how real are the dangers to which we refer.



FIG. 7. — THREE-INCH PIPES. (THE ONE ON THE RIGHT COULD BE MADE UP ONLY SIX THREADS. THE OTHER WAS STANDARD, OR NEARLY SO.)

Fig. 1 shows the ends of four-inch, six-inch, and eight-inch pipes, as cut from pipe just received from the mills of the manufacturer. These threads are not absolutely correct, but they are so nearly in conformity with the standard that they would make up all right, and give a good job. They are strictly standard so far as the number and shape of the perfect threads are concerned, and where they depart from the standard they do so only by the omission of a couple of the imperfect threads. The perfect threads, and the two that are slightly flat on top, are correct in each case. We may say that we have not tried to select specimens, for any of these illustrations, that would represent extreme cases, either of conformity to the standard, or of departure from it;

because we have thought that it would be much more useful and instructive to take specimens that would fairly represent what would be found in actual practice.

For comparison with what may be expected from the mills, we present Figs. 2, 3, and 4, which show specimens of four-inch, six-inch, and eight-inch pipe, respectively, as selected at random from shops where the pipe had just been made ready to go into a new job, or had just been taken out from an old one. As will be evident from the engravings themselves, Figs. 2 and 4 represent pipe that has been taken out, and Fig. 3 represents a piece of new pipe that has just been threaded for use. The piece shown in



FIG. 8. — FOUR-INCH PIPE. THREAD WITHOUT SUFFICIENT TAPER; MADE UP ONLY FOUR THREADS.

Fig. 2 was threaded correctly on the right-hand end, except that some of the imperfect threads were omitted. Otherwise it was standard, at this end, and would make a good joint. At the left-hand end, however, it was not standard, but was short by several perfect threads. The thread on the piece shown in Fig. 3 was only $1\frac{1}{4}$ " long, over all; whereas the standard, for this size of pipe, calls for a total threaded length of 2.01", so that the thread on the actual specimen was fully three-quarters of an inch short. In the specimen shown in Fig. 4, the threads were not clean and sharp, and, moreover, were not of standard shape. In making up this piece of pipe, it had been found impossible to force it into the fitting more than about three threads; and it had been in

use, for how long or under what pressure we do not know, with only these three threads to take the entire strain.

Other specimens of piping that have done service, while departing materially from the standard, are shown in Figs. 5, 6, 7, and 8. It is almost impossible to preserve, in a photo-engraving, all the little indications that tell the story, to the eye, of what the

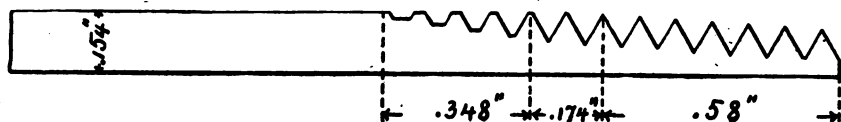


FIG. 9. — SECTION THROUGH A TWO-INCH PIPE.

pipe is, and how it has been threaded; and to assist the reader somewhat in judging of the character of the threads that we have here shown, we have secured slips of paper to the pipes before photographing them, these slips being so adjusted that their ends show the distance to which the various specimens had been made up into their fittings. The case shown in Fig. 8 is perhaps of special interest, because this pipe was threaded, at its upper end, for a length of $2\frac{1}{4}$ " when the standard only calls for a total length of

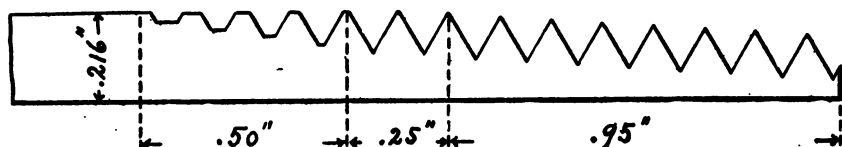


FIG. 10. — SECTION THROUGH A THREE-INCH PIPE.

thread, over all, of 1.80"; yet, notwithstanding the great length of the thread, it had been found impossible to make the pipe into the fitting to a greater distance than four threads, because the thread was almost perfectly straight, and had hardly any sensible taper, at all.

When the specimens that we have illustrated are examined at first hand, they show almost every kind of a departure from the standard that they are supposed to conform to. Some are threaded too short, some do not have clean threads at all, some have threads that are wrong in shape, and some do not have the proper taper. The fact that the specimens that we have shown and described are not extreme cases in any sense, but

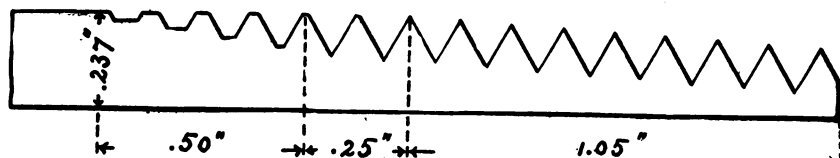


FIG. 11. — SECTION THROUGH A FOUR-INCH PIPE.

were selected almost at random from pipe shops, shows how grave this matter is; and we want to say again, that we can hardly find words strong enough to express our condemnation of pipe work that is done in any such bungling and reckless fashion. Too much care cannot be exercised in making pipe connections, particularly in steam pipe and boiler work, when failure is liable to cause loss of life. There is no reason whatever why a workman cannot determine at once, in fitting up piping, whether or not a joint is properly put together, and whether or not it is of the strength intended for

standard fittings and pipe. Some of the specimens here illustrated show evidence that calking has been resorted to, in order to make them tight. This is all wrong, for if the joint is properly made up, calking will not be necessary. Calking to obtain tight work is proof of an imperfect joint.

We reproduce, in addition to the half-tone engravings, the diagrams that were used in our earlier article on this subject, to illustrate the correct proportions of standard threads on several common sizes of pipes.

All pipe that is to be used in steam, water, and gas fitting should be of standard size, standard thickness, and standard thread, and should be round and straight. All fittings should be of heavy gray iron castings, with heavy beads, and with clean, full

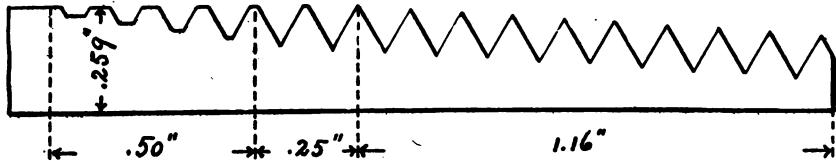


FIG. 12.—SECTION THROUGH A FIVE-INCH PIPE.

threads, tapped to standard gauge; and for high pressure service (100 pounds and over), the fittings should be extra heavy high pressure fittings.

In handling large, heavy pipe, the threads sometimes become bruised so as to prevent the proper making up of the joint; and for this reason the precaution of examining both the fitting and the pipe before making the joint, should never be neglected. In the best practice a thread guard is used in shipping and handling heavy pipe, and we are glad to say that this practice is now followed by a considerable and increasing number of contractors.

Often, in connecting to boilers and tanks, no re-enforcing piece is used; and we have often found that the opening in the shell of a boiler, where the blow-off is re-

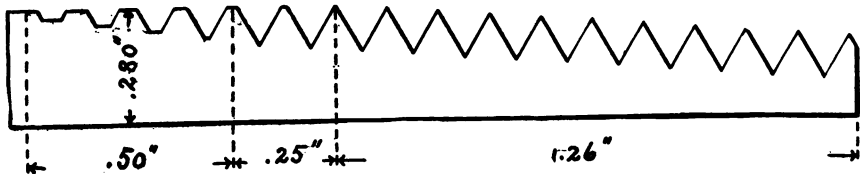


FIG. 13.—SECTION THROUGH A SIX-INCH PIPE.

forced, is cut large, so that only the re-enforcing piece is threaded. This is all wrong. To obtain a proper strength or holding power, both the re-enforcing piece and the shell should be threaded.

In conclusion we desire to say a word about what we consider to be a bad practice among manufacturers of pipe. At the present time, when there are so many pipe attachments to boilers, carrying full boiler pressure and perhaps subjected to an intense heat also, and endangered, often by corrosion, it appears to us just and proper that manufacturers of such pipe should brand their products in the same way that boiler plates are branded, giving the name of the manufacturer, the quality of the material, and the pressure to which the pipe has been tested, as a guarantee of good faith. In the present state of affairs we have to take these things on trust, for there is no certain way of demonstrating from what plant a given sample of pipe came, unless the plant

is known within a limited number of places. In this latter case the character of the marks left by the welding clamps will sometimes serve to determine from which plant it came; but it should not be necessary to trust to such an uncertain and often inapplicable method of identifying the source from which it came. There is nothing unreasonable about this suggestion, and we should think that all well-intentioned makers of pipe would be glad to adopt such a plan, in order to protect themselves from unjust suspicion, when an inferior piece of pipe, from some less scrupulous maker, comes to light.

Dangers of Electrical Roads.

There is a clamor among unthinking persons for the immediate substitution of electricity for steam as a motive power in the tunnel of the New York Central railroad, and on the elevated roads in New York. Now the substitution of electricity for horse power on the surface roads has largely increased the loss of life, and the discomfort of passengers, who are worse crowded than before and thrown about by the sudden starts and jerks of the motive power, and the average time of transit through the crowded city is no better than it used to be. The profit of the change has been to the company and not to the public. The elevated roads have carried more passengers with less loss of life and a nearer approach to rapid transit than any system that New York has had. Boston is establishing elevated roads in place of the noisy and disagreeable underground roads, upon which New York is now spending millions without any assurance of their success. Changes are not always improvements. The following from an English paper illustrates one of the dangers of electrical roads :

"An alarming accident, attended by the loss of six lives, took place at the Dingle Station of the Liverpool Electrical Overhead railway on Monday afternoon. As the train was in the tunnel between the Herculeum Dock Station and the Dingle terminus—quite close to the latter—one of the motors fused, and set fire to the train, the platform, and a stock of creosoted sleepers, and a second train standing in the tunnel. Unluckily a gale from the westward was blowing at the time through the tunnel, which converted it into a chimney, and though all the passengers but two got safely out of the station, four of the station staff lost their lives while attempting to put out the flames. The gale undoubtedly aggravated the disaster, but none the less the catastrophe has revealed the possibility of a serious danger in connection with railways worked by electricity—a danger, be it noted, inherent in the mode of propulsion, and not due, as in the case of the Abergle disaster, to collision with extraneous inflammable matter."

Mr. George Westinghouse, president of the Westinghouse Electric and Manufacturing Company of Pittsburg, directs attention to this accident and enforces the dangers of electricity, in a letter to the *New York Times* of January 11th, as follows:

"It may prove useful at this moment to direct the attention of the press to certain features incident to the use of electricity for the operation of trains or cars. From the comments which have already been made in regard to the accident which is now uppermost in our minds, it seems to be assumed that such accident would in all probability not have occurred if the colliding trains had been propelled by electricity, and also that the absence of steam would have lessened the risk to the occupants of the telescoped cars. As a matter of fact, with an electrically operated train the risk of accident will, judging by experience, be increased rather than diminished because of the presence of the heavy electrical machinery which it is proposed to attach to several cars of each train. Already there have been many serious collisions with great loss of life between electric cars, while there have been numerous cases in New York and other places in

which cars have been quickly destroyed by fires which have resulted from some derangement of the electrical apparatus or circuits, and in some instances so quickly that passengers have had scarcely time to escape to the street.

"It should be borne in mind that the electric energy required to operate a heavy train is sufficient to melt a considerable bar of iron, or to start a dangerous fire, if anything goes wrong upon a car of ordinary combustible construction, much more readily than the car stove, the use of which has been abolished by law. Therefore, if a collision were to occur between two electrically-fitted trains, each having several combustible cars thereof fitted with electrical apparatus and carrying electrical circuits throughout, there could be an accident of so serious a character as to start an agitation having for its purpose the abolition of the use of electricity altogether, or, at least, to compel the railway companies to abandon the use of combustible cars fitted with electric motors.

"The destruction by fire of a car or train upon a street or upon a level is one thing, but such an occurrence upon an elevated railway or in a tunnel can have consequences the contemplation of which should lead to wise regulations governing the construction and use of electrically propelled trains and thereby insure to the public the rapid development of electric traction."

The directors of the New York Central railroad should not be influenced by popular clamor to make changes which are simply experimental, and which may involve even greater horrors than have yet been endured in connection with rapid and frequent travel.
— *New York Observer*.

"Also a Pig."

Under the heading of profit and loss in the Standard Oil Company's books there is an entry "1 bulldog," followed by some details. The dog is catalogued on the loss side of the balance. It is said that he is the only dog ever owned by that powerful combination, and after its experience with him the company is not likely to invest in any more of his kind. He became a Standard Oil dog in this way:

One of the company's stations near Charleston, W. Va., had suffered the loss of many empty barrels from the depredation of thieves, who found them useful as firewood. After trying in vain to capture or get a shot at the thieves, Blake Stewart, who had charge of the office, sent a requisition to the division office in Baltimore for one large and savage bulldog. In the course of time, after some fluctuations of red tape, the division office notified Mr. Stewart that it possessed no facilities for the purchase or manipulation of savage bulldogs, but that if he thought he could obtain one locally, of a sufficient degree of ferocity, for \$10, that sum was at his disposal. Two days later a negro delivered to Mr. Stewart a brindle bulldog chained to the end of a pole. The negro explained to Mr. Stewart that the reason he used the pole instead of a rope was that its stiffness was of advantage in keeping the beast at a proper and respectful distance. The dog was duly established in the barrel yard, and went on record as an employee of the Standard Oil Company, with an allowance for maintenance.

The office force then set about making the acquaintance of the new acquisition. Mr. Stewart conducted his advances from the top of a shed, which, being an agile and athletic person, he had gained just before the dog got to him.

The head clerk tried the power of his hypnotic eye on the beast, and, though normally a dignified and slow-moving person, he cleared the fence by a vault that was the admiration of all beholders. Several other employees tried to establish friendly relations, and those that got away intact were the lucky ones.

They named the dog Fury, and employed a trainer from Charleston to come down and train him. Three minutes after his introduction to Fury the trainer gave up his job, together with a considerable portion of his raiment, and went home. Thereafter Fury ruled the roost. There were no more barrels stolen, for his reputation went abroad in the land; but there were other difficulties. When a stock of barrels was acquired, however, it took the major part of the office force, armed with clubs, to drive Fury to cover while the workmen got the stock out.

In the course of time Fury became a little more peaceable and would allow a few favored acquaintances around the place; but no stranger ever got so much as one foot inside the inclosure without hastening to take it out again before the dog could fasten to it. Fury earned his salary.

One day a wandering pig came nosing around the inclosure, found a loose place in the fence, and made his way in. Now the West Virginian breed of pig is not the fat, lazy, and inert porker of the farmyard. He is a lean, razor-backed, sinewy animal who has had to make his own way in the world for so long that he is thoroughly equipped to take care of himself. The only thing he considers it worth while to get out of the way of is a railroad train, and he sometimes contests the right of way with that, under which circumstances both train and pig commonly leave the track together. Either Fury didn't understand the nature of the invader, or his lordly career had puffed him up with an undue sense of his own abilities. With a snarl of concentrated rage he made for the trespasser, and launched his powerful body like a thunderbolt straight at piggy's throat.

There was a wild clamor of grunts, squeals, growls, and howls that brought Mr. Stewart and the rest out in haste. All they could see was a mad whirl of dust and writhing bodies. Then a streak emerged from the whirl. It was Fury. Away he went, yelling murder at every leap, and the pig after him. After two circuits of the yard, Fury noted the hole in the fence, and with a yelp of mingled joy and shame started through it. It was more of a squeeze for piggy, but he got through, too. There was no doubt about his intentions; he meant murder. Fury realized it. He took to the railroad track and headed eastward. When the curve, half a mile up the road, hid him from view, the pursuer was running head down and tail up, with a vigor which suggested that obstinacy of pursuit for which his kind is proverbial.

At the Standard Oil office they waited until closing time, expecting to gloat over the return of a chastened and drooping Fury. But he came not; neither that day nor the next, nor the next. Then Mr. Stewart, following his instructions to notify the company of any loss of property, wired the division office at Baltimore as follows:

"Company's bulldog last seen headed for Baltimore. Look out for him. Details follow; also a pig."

The office got the details later, by mail; but they haven't yet seen the bulldog or the pig.—*New York Sun*.

THE article on page 9 of this issue, entitled "Dangers of Electrical Roads," was inspired by the recent horror in the tunnel of the New York Central & Hudson River railroad, in New York city. We are inclined to think that most persons who have had experience with New York's horse cars and also with her electric cars will feel that the case against the electric cars is put too strongly. We think few would prefer to return to horses. Yet there is much sense in the article, and Mr. Westinghouse's words are specially worthy of attention, as he is an authority on safety in railway travel.

The Locomotive.

HARTFORD, JANUARY 15, 1902.

J. M. ALLEN, A.M., M.E., *Editor.*

A. D. RISTEEN, *Associate Editor.*

THE LOCOMOTIVE can be obtained free by calling at any of the company's agencies.

Subscription price 50 cents per year when mailed from this office.

Bound volumes one dollar each. (Any volume can be supplied.)

Boiler Explosions.

OCTOBER, 1901.

(289.) — The boiler of a threshing machine outfit exploded, on September 13th, at Colfax, Wash. Charles W. Rich was killed. [This account was received too late for insertion in the regular September list.]

(290.) — On October 1st the boiler of a traction engine exploded on the White farm, at Fleming, some six miles south of Auburn, N. Y. Charles White was instantly killed, and his brother, Edward White, was injured so badly that it was thought that he could not recover. Later advices, however, indicate that his injuries were not fatal.

(291.) — On October 1st a boiler exploded at the Nickel Plate mine of the Brazil Coal Company, at Ehrmanndale, near Terre Haute, Ind. The air was filled with bricks, timbers, and fragments of the boiler, yet nobody was injured, although a number of men were standing about the shaft at the time. We have seen no estimate of the property loss, but it is said that it will amount to several thousand dollars.

(292.) — The boiler of a cotton gin exploded, on October 3d, on Luster Babb's plantation, near Laurens, S. C. Stewart Babb was hurt so badly that he died soon afterwards. W. C. Deck, Luster Babb, Guy Babb, William Boland, Thomas Boland, and Henry Meekins were also injured to a lesser extent.

(293.) — A boiler exploded, on October 4th, on the tug-boat *Elmer Wood*, at New Orleans, La. William E. White, Andrew Brown, Samuel Bland, and John Marsh were seriously injured, but it is believed that all will recover. It is said that the damage to the tug will amount to several thousand dollars.

(294.) — On October 5th a boiler used for steaming oysters exploded in the oyster house of James Stevens, at Georgetown, D. C. Charles H. Dove and Mrs. Mary Stevens and her two children, Fred and Helen, were seriously injured.

(295.) — On October 6th the boiler of a threshing machine outfit exploded at Brampton, near Forman, N. D. Edward Ashley, who was one of the owners of the machine and also its engineer, was struck in the head by a piece of iron, and instantly killed. Three other men were fatally injured, and several received minor injuries.

(296.) — A boiler exploded, on October 7th, in Rickert's rice mill, New Orleans, La. John Hausch, Martin Trier, and Emile Pfeffer were severely scalded and bruised. It is said that the explosion consisted in the safety-valve blowing bodily off of the boiler.

(297.) — A boiler exploded, on October 8th, in R. S. Myers' sawmill, on the Sunflower river, near Rolling Fork, Miss. Mr. R. E. Maxwell and one other man, whose

name we have not learned, were killed, and several other persons were injured. The mill was wrecked.

(298.) — On October 9th a boiler exploded in Davis & Couch's laundry, at Italy, Tex. Claude Powell, Clyde Wolaver, Thomas Robinson, and William Davis were severely injured, and it is doubtful if Powell can recover. The laundry was a new one, and the boiler had just been fired up to test the machinery.

(299.) — On October 9th a boiler exploded in the Hays Manufacturing Company's plant, in the rear of the Hotel Liebel, at Erie, Pa. Nobody was killed, but Ella Dolan, Frances Levenduski, Annie Schimagua, May Bentley, John Davidson, and Charles Whandon were injured. A three-story brass foundry, a three-story annex to the Hotel Liebel, a warehouse belonging to a hardware store, and the café of the hotel were totally demolished, and the property loss was in the neighborhood of \$30,000. (An illustrated account of this explosion was given in the issue of *THE LOCOMOTIVE* for October, 1901.)

(300.) — A boiler exploded, on October 10th, at Inez, Ky. Brown Salmons was killed, and four other men, whose names we have not learned, were injured.

(301.) — A boiler exploded in the Lone Star Salt Company's plant, at Grand Saline, Tex., on October 10th. Fireman Edward Clay was killed, and J. W. Wilson, John Smith, and William Price were severely injured. Parts of the boiler were thrown several hundred feet. The property loss will amount to several thousand dollars, according to the accounts that we have received.

(302.) — On October 10th a boiler exploded at the New Pittsburg Coal Company's plant, at Blatchford, near New Pittsburg, Ohio. Fireman Luke Hamilton was killed, and several other men were injured.

(303.) — A boiler exploded, on October 10th, in Rennie Butterworth & Co.'s sawmill, at Dewitt, Va. Albert G. Smith was killed, and Norman Smith, Norman Wright, and several other men were injured. The mill was wrecked, and the property loss was large.

(304.) — An explosion occurred, on October 11th, in the boiler room of the Howe factory, at Peru, Ind., scalding A. B. Ulrich fatally, and badly injuring Joseph Kyle and W. H. Folger. We have not learned the exact nature of the explosion, except that it consisted in the failure of some part of the boiler.

(305.) — On October 12th a boiler exploded at Grand Junction, Colo. Nobody was injured, although the engineer had a very narrow escape. The boiler belonged to Samuel Cox.

(306.) — A terrible boiler explosion occurred, on October 13th, in the plant of the Detroit Copper Company, at Clifton, Ariz. W. W. Hogan and F. A. Adamitz were instantly killed, and Harry Davidson, José Antiveras, and several other men were severely injured. The smelting plant of the Detroit Company is one of the largest in Arizona.

(307.) — On October 14th the boiler of a locomotive on the Mexican International Railroad exploded at Sabinas, near Eagle Pass, Tex. The engineer, the fireman, and a little girl, daughter of the pumper at Aure, were killed.

(308.) — The boiler of Frank Mattechek's threshing outfit exploded, on October 18th, at Webster, S. D., badly wrecking the outfit. It fortunately happened that none of the crew was in the immediate vicinity of the machine at the time, so that no one was injured.

(309.) — On October 19th a boiler used in making chewing gum exploded in the Novelty Candy Company's works, on Grant Street, Pittsburg, Pa. Vincenzo Canduni

was injured so badly that he died two hours later. We have not learned further particulars.

(310.)—On October 21st the boiler of Isaac Jennings' portable sawmill exploded near Berea, Ohio. Charles Weeder was killed, and Edwin Irving was fatally injured. John Seebold, William Simmons, and one other man, whose name we do not know, were also injured to a lesser extent.

(311.)—On October 21st a boiler exploded on the Elk lease, at Spurgeon, some fourteen miles south of Joplin, Mo. Lewis Oliver, Milton Oliver, and Herbert Hays were severely injured, and at last accounts one of the men was not expected to recover. The boiler room was completely wrecked.

(312.)—On October 21st the boiler of a threshing-machine outfit exploded between Clyde and Lockport, N. Y. Frank Lee was instantly killed. One report states that "the crown sheet of the engine fell into the fire pot, causing an explosion."

(313.)—A boiler exploded, on October 22nd, at Whitehouse, near Ashland, Ky. A man named Simmons was injured so badly that he died two days later. Several other persons were about the mill, but none of them was hurt. The boiler belonged to Mr. Newton Music.

(314.)—On October 21st a boiler exploded in the Fleetwood-Jackson Lumber Company's mill, at Hertford, N. C. Three men were injured, and the property loss was probably \$5,000. Most of the estimates that we have seen place it at \$20,000, but we are of the opinion that \$5,000 is nearer to the truth.

(315.)—Mr. W. H. Wofford was instantly killed, on October 24th, by the explosion of a boiler in Mr. E. S. Smith's cotton gin, at Glenn Springs, near Spartanburg, S. C. We have seen no estimate of the property loss.

(316.)—On October 24th the boiler of locomotive No. 710, on the Wabash Railroad, exploded two miles north of Boody, Ill. Thomas Evers and Thomas Holland were killed; Engineer F. M. Donnelly was injured. (George Anthony, a tramp, had his leg blown off; ut as the leg was a wooden one, we do not count this an injury!)

(317.)—On October 24th a boiler exploded at the Carrie furnaces of the Carnegie Steel Company, at Rankin, Pa. Michael McAllister and two other men, whose names we do not know, were very badly injured, and Harry Elby received minor injuries. It is said that the loss to the Carnegie Steel Company, on buildings and machinery, and on damage to the furnace, amounted to something like \$100,000.

(318.)—A boiler exploded, on October 25th, in George W. Bragg's grist mill, at Laurel Creek, near Hinton, W. Va. Mr. Bragg was the only person who was injured. He was severely scalded by escaping steam.

(319.)—On October 26th a boiler exploded in Andrew Meadows' stave mill, at Mahan Station, near Williamsburg, Ky. Frank Meadows was killed, and James Meadows was fatally injured.

(320.)—A boiler exploded, on October 28th, in John Sewell's sawmill, about seven miles south of Texarkana, Tex. Engineer W. P. Martin was instantly killed, and J. H. Sewell (the owner of the mill), Columbus Nolan, and Flippin McKeehan were seriously injured, and it is feared that Sewell may die. The boiler was thrown to a distance of 300 feet, and the mill was destroyed.

(321.)—A boiler exploded, on October 28th, at King's cider mill, at Pittsford, near Rochester, N. Y. George Snyder was seriously injured.

(322.) — On October 29th a boiler exploded in James Gillis' sawmill at Neva, nine miles north of Antigo, Wis. The fireman was scalded.

(323.) — A boiler exploded, on October 29th, in the Atkinson Cistern Company's plant at Toledo, Ohio. C. H. Atkinson was scalded and burned so badly that he died later in the day.

(324.) — The crown sheet of locomotive No. 171, on the Illinois Central Railroad, blew down, on October 29th, at Chicago, Ill. Engineer John Normile and Fireman James S. Marlowe were thrown from the cab and badly scalded and bruised. It is thought probable that both men will die.

(325.) — On October 30th a safety boiler exploded in the Baldwin Locomotive Works, at Philadelphia, Pa. Edward Gaughan and Frank Colvin were instantly killed, and James Dawson was injured so badly that he afterwards died.

(326.) — On October 30th a boiler exploded near Elyria, Ohio. One man was killed, and another injured. We have not been able to learn further particulars of this explosion.

(327.) — A boiler exploded, on October 31st, in Leiper's quarry, at Leiperville, near Chester, Pa. A large section of the boiler was thrown into Fields Bros.' brick yard a quarter of a mile away, striking a bench at which twenty men had just been at work. A boy saw the huge projectile, apparently dropping from the sky, and uttered a cry of warning, at which the men scattered, just in time to escape being struck. It was thought, for a few moments, that a meteor had fallen.

(328.) — A heating boiler exploded, on October 31st, in the basement of the Homer block, at Helena, Mont. No great damage was done.

AN important feature of the steam turbine, not always considered, is the freedom from great or sudden angular variations in speed. This defect in reciprocating engines is of constantly increasing importance. With its high rotative speed and entire absence of reciprocating parts, it is practically impossible for any appreciable variation in speed to occur in the course of a single revolution of the turbine, the speed changes necessarily extending over a number of revolutions, and being gradual in their nature; while, with the use of properly-designed governors, even these gradual variations in speed may be kept within very narrow limits.

A modern "turbo" plant of 1,500 kilowatt capacity will stand on a floor space of 728 square feet, and will have its own condensing plant at that. No foundations are needed for its reception, and no oil is necessary for the lubrication of the rotating parts that are acted on by steam. In both these items it will be seen, at once, that large economies will be effected. The absence of oil in the steam does away with one of the great sources of trouble that ordinarily have to be carefully guarded against, in using the water of condensation in the boilers again. The machine, when delivered, can be assembled on its particular portion of the engine room floor, and no vibration will take place while the plant is in motion. The appearance of the engine room will also be greatly improved, because the "turbo" sets occupy little head room, and consequently will cut off little or no light from the windows. The small vertical space needed also does much to decrease the cost of buildings, as well as the steam and exhaust piping.

That the early types of turbine were extravagant in steam is well known; but this fault was due to the comparative scarcity of data in the design of such engines, as well as to the fact that very small units were required for electric supply purposes. — *The Engineering Magazine*.

Incorporated
1866.



Charter Per-
petual.

Issues Policies of Insurance after a Careful Inspection of the Boilers,
COVERING ALL LOSS OR DAMAGE TO
BOILERS, BUILDINGS, AND MACHINERY,
AND DAMAGE RESULTING FROM
LOSS OF LIFE AND PERSONAL INJURIES,
CAUSED BY
Steam Boiler Explosions.

Full information concerning the plan of the Company's operations can be obtained at the
COMPANY'S OFFICE, HARTFORD, CONN.,
Or at any Agency.

J. M. ALLEN, President.	J. B. PIERCE, Secretary.
W. B. FRANKLIN, Vice-Prest.	L. B. BRAINERD, Treasurer.
FRANCIS B. ALLEN, 2d Vice-Prest.	L. F. MIDDLEBROOK, Asst. Sec.
E. J. MURPHY, M. E., Consulting Engineer.	

Board of Directors.

J. M. ALLEN, President.	Hon. NATHANIEL SHIPMAN, Judge United States Circuit Court.
FRANK W. CHENEY, Treas. Cheney Brothers Silk Manufacturing Co.	C. C. KIMBALL, President Smyth Manufacturing Co., Hartford, Conn.
CHARLES M. BEACH, of Beach & Co.	PHILIP CORBIN, P. & F. Corbin, New Britain, Conn.
DANIEL PHILLIPS, of Adams Express Co.	GEORGE A. FAIRFIELD, Prest. Hartford Machine Screw Company.
RICHARD W. H. JARVIS, Prest. Colt's Fire Arms Manufacturing Co.	J. B. PIERCE, Secretary Hartford Steam Boiler Inspection and Insurance Co.
LEVERETT BRAINARD, of The Case, Lockwood & Brainard Co.	ATWOOD COLLINS, Pres. Security Co., Hfd, Conn.
GEN. WM. B. FRANKLIN, late U. S. Commissioner to the Paris Exposition.	LUCIUS F. ROBINSON, Hartford, Conn.
Hon. FRANCIS B. COOLEY, of the National Exchange Bank, Hartford, Conn.	JOHN O. ENDERS, United States Bank, Hartford, Conn.
GEORGE BURNHAM, Baldwin Locomotive Works, Philadelphia.	

GENERAL AGENTS.

**THEO. H. BABCOCK,
CORBIN & GOODRICH,
LAWFORD & McKIM,**

C. E. ROBERTS,

**H. M. LEMON,
C. C. GARDINER, Jr.,
S. R. BENJAMIN,
W. G. LINEBURGH & SON,
BURWELL & BRIGGS,
JAMES W. ARROTT, Ltd.,
MANN & WILSON,
THOS. F. DALY,
W. S. HASTIE & SON,
LOUIS V. CLARK & CO.,
PETER F. PESUD,**

CHIEF INSPECTORS.

**R. K. McMURRAY,
WM. J. FARRAN,
R. E. MUNRO,**

**F. S. ALLEN,
JAMES L. FOORD,
VICTOR HUGO,
F. S. ALLEN,
J. H. RANDALL,
H. A. BAUMHART,
BENJAMIN FORD,
J. B. WARNER,
T. E. SHEARS,
W. M. FRANCIS,
H. E. STRINGFELLOW,
R. T. BURWELL,**

**NEW YORK CITY.
PHILADELPHIA, Pa.
{ BALTIMORE, Md.
{ WASHINGTON, D. C.
{ BOSTON, Mass.
{ PROVIDENCE, R. I.
CHICAGO, ILL.
ST. LOUIS, Mo.
HARTFORD, CONN.
BRIDGEPORT, CONN.
CLEVELAND, OHIO.
PITTSBURG, PA.
SAN FRANCISCO, CAL.
DENVER, COL.
CHARLESTON, S. C.
BIRMINGHAM, ALA.
NEW ORLEANS, LA.**

OFFICES.

Office, 160 Broadway.

" 432 Walnut St.

" Chamber Commerce.

" 511 Eleventh St., N.W.

" 125 Milk St.

" 29 Weybosset St.

" 169 Jackson St.

" 319 North Fourth St.

" 650 Main Street.

" 1 Sanford Building.

" 208 Superior St.

" 401 Wood St.

" 306 Sansome St.

" 210-215 Taber Op. Bldg.

" 44 Broad St.

" 2021 First Ave.

" 818 Gravier St.

INDEX TO VOL. XXIII.—1902.

ARTICLES MARKED WITH A STAR (*) ARE ILLUSTRATED.

- Acacia. — See *Locust*.
 Accident to an economizer, *177.
 from a blowoff pipe, *49.
 from ignition of vapors in an empty boiler, 107.
 — See also *Explosion*.
 Accidents, railway, and boiler explosions, 123.
 — See also *Boiler Explosions*, *Electric Roads*, etc.
 Alaska, size of, 183.
 Arithmetic, elementary principles of, 71, 76.
 Babcock and Wilcox Boiler, *161.
 Baldwin Locomotive Works, 70th anniversary of, 39.
 Beading. — See *Flaring*.
 Bed warmer, explosion of a, 67.
 Belleville Boiler, *161.
 Bethlehem, end of steam hammer at, 63.
 Bituminous coal, firing with, *145.
 Blowoff pipe, failure of a, *49.
 Boiler explosion (Penberthy), *113.
 due to scale, a, *97.
 in Spain, 105.
 humorous account of, 159.
 from ignition of vapors, 107.
 explosions and railway accidents, 123.
 cause of, 62.
 monthly lists of, 12, 51, 68, 84, 100, 118, 135, 149, 173, 180.
 errors in, 30, 138.
 during 1901, summary of, 71.
 inspection, 36.
 insurance, 141.
 cancellation of by insured when boilers are dangerous, 121.
 job, another scamped, *33.
 locomotive, explosion of a, *81.
 scale and the transmission of heat, *129.
 toy, explosion of, 105.
 tubes, the flaring of, *65.
 Boilers, naval, concerning, *161.
 Boiling it down, 159.
 Bolt, economizer, corrosion of, *177.
 Brainard, Mr. Leverett, death of, 122.
 Burwell, Mr. R. T., instrument for boiler calculations, 138.
 Canal, the Isthmian, 39, 92, 107.
 Cancellation. — See *Insurance*.
 Carnegie Institution, 30.
 Chance (note), 191.
 Charleston, no place like, 87.
 Coal, pulverized, 63.
 soft, on firing with, *145.
 — See also *Fuel*.
 Collisions. — See *Railroad Accidents*.
 Cooper, J. Fenimore, translation of, 143.
 Corrections to boiler explosions, 30, 138.
 Corrosion of an economizer bolt, *177.
 Darien. — See *Canal*.
Desert Queen, 56.
 Detroit, fearful boiler explosion at (Penberthy), *113.
 Dictionary, proposed trilingual, 175.
 Dog. — See *Standard Oil Company*.
 Dürr boiler, *161.
 Earthquakes and the isthmian canal, 92.
 Economizer, accident to an, *177.
 Education of mechanical engineers, 171, 187.
 Egg shell, strength of, *155.
 Electric roads, dangers of, 9, 11.
 Electricity, atmospheric, and thunderstorms, 109.
 Engineering, modern mechanical, 171, 187.
 Errors in boiler explosions, 30, 138.
 Explosion, boiler, due to scale, *97.
 of a locomotive boiler, *81.
 a fearful boiler (Penberthy), *113.
 from ignition of vapors by a candle, 107.
 boiler, humorous account of, 159.
 of a toy boiler, 105.
 boiler, in Spain, 105.
 of a bed warmer, 67.
 — See also *Accident*.
 Explosions, boiler, and railway accidents, 123.
 boiler, causes of, 62.
 errors in, 30, 138.
 — See also *Boiler Explosions*.
 Express train, an "all stations," 187.
 Farewell, the pastor's, 79.
 Flanges, standardization of, *17.
 Flaring of boiler tubes, *65.
 Flywheels, power lost in, 111.
 Forging steel, conditions for, 138.
 Foucault pendulum experiment, 191.
 Fritz, Mr. John, 184.
 Fuel, peat as, 105.
 oil, 38, 154.
 pulverized, 63.
 — See also *Coal*.
 Gases, explosive, accident from, 107.
 Grasshopper. — See *Locust*.
 Gravity. — See *Weight*.
 Gulf Stream myth, the, 124.
 Habit, 159.
 Hammer, the Bethlehem steam, 63.
 Heat, transmission of, through scale, *129.
 Hog. — See *Pig*.
 Injector Co., Penberthy, boiler explosion at plant of, *113.
 Inspection, steam boiler, 36.
 Inspectors' reports, 23, 104, 118, 148, 175, 179.
 summary of for 1901, 27.
 Insurance, steam boiler, 141.
 boiler, cancellation of by insured, when boilers are dangerous, 121.
 Iron. — See *Fritz* and *Steel*.
 Joint, strengthening a weak, by straps, *33.
 Kelvin, Lord, 93.
 on the metric system, 88.
 Lexicon, proposed trilingual, 175.
 Lightning, 109.
 Locomotive boiler, explosion of a, *81.
 Works, Baldwin, 70th anniversary of, 39.
 Locust trees, big, 143.
 Lord Kelvin, 88, 93.
 Mars, concerning maps of, 137.
 Mass. — See *Weight*.
 Mathematics. — See *Arithmetic*.
 Measurements, precision in, 172.

THE LOCOMOTIVE—INDEX.

Measures. — See *National Bureau of Standards*.
 Mechanical engineering, modern, 171, 187.
 Metric system, 56, 88, 153.

See also *National Bureau of Standards*.

Minister's farewell, 79.
National Bureau of Standards, 126.
Naval boilers, *161.
Nelson, Mr. George E., death of, 92.
Nicaragua. — See *Canal*.
Niclausse boiler, *161.
Numbers, the philosophy of, 71, 76.
Obituary:

Mr. George E. Nelson, 92.
 Mr. Leverett Brainard, 122.

Oil fuel, 38, 154.
 vapors, explosion of, 107.
 — See also *Standard Oil*.
Panama Canal, the, 39, 107.
 — See also *Canal*.

Pastor's farewell, 79.
Peat as fuel, 105.
Penberthy Injector Co. boiler explosion, *113.
Pendulum experiment, Foucault, 191.
Perry, Professor John, 171, 187.
Petroleum fuel, 38, 154.
 vapors, explosion of, 107.

"Pig, also a," 10.
Pineapple, virtues of the, 152.
Pipe threads, *1.

flanges, standard, *17.
 blowoff, failure of a, *49.

Plates, transmission of heat through, *129.
Policy. — See *Insurance*.

Popular Science Monthly, editing of, 137.
Precision in measurements, 172.
Pressure, danger of making repairs under, *177.
Probabilities (note), 191.
Prout's hypothesis, 157.

Publications:

Memorandum of Manchester Co., 22.
Catalogue of Eddy Valve Co., 23.
Engineering Magazine, 23.
Engineering Practice, etc. (Wakeman)
 47.
Polytechnic Engineer, 106.
Electrical Catechism, 106.
Report of the Norddeutscher Verein,
 127.

Publications:

Popular Science Monthly, 137.
American Machinist, 171.
Cassier's Magazine, 171.
Dictionary, the Trilingual, 175.

Pulverized coal, 63.
Rail, third. — See *Electric Roads*.
Railroad accidents and boiler explosions, 123.
Repairs, danger of making, under pressure, *177.
 — See also *Joint*.
Rolling Mill. — See *Fritz*.
Scale, boiler explosion due to, *97.
 and the transmission of heat, *129.

Schooner, prairie, 55.
Science, editing of, 137.
Scotch boiler, *161.

Seam. — See *Joint*.
Ship, a desert, 55.
 canal. — See *Canal*.

Smoke abatement in large cities, 73.
Soft coal, firing with, *145.
Spain, boiler explosion in, 105.
Standard Oil Co.'s dog, 10.
Standardization of flanges, *17.
Standards, National Bureau of, 126.
Statement of the H. S. B. 1. & I. Co., abstract of, 31.
Steam hammer, end of the Bethlehem, 63.
Steel, the imperative conditions for forging, 138.
 — See also *Fritz*.

Storms, thunder, and atmospheric electricity, 109.
Straps. — See *Joint*.

Summary of inspectors' reports, 27.
 boiler explosions, 71.

Tests. — See *Inspection*.

Third rail. — See *Electric Roads*.

Threads, pipe, *1.
Thunder storms and atmospheric electricity, 109.

Trolley. — See *Electric Roads*.
Tubes, boiler, the flaring of, *65.

Turbine, steam, 15, 170.
Vapors, explosive, ignition of by a candle, 107.

Water tube boilers for naval use, *161.
 low, boiler explosions from, 62.

Weight, conservation of, in chemical reactions, 157.
Weights and Measures. — See *National Bureau of Standards, and Metric System*.

